Of special interest to entomologists are the two appendices which list Fitch's entomological publications and his contributions to entomological taxonomy. Barnes also discusses the unfortunate dismemberment and loss of much of Fitch's extensive collection.

We need more biographies like this one. Charles V. Riley, Benjamin D. Walsh, Asa Spring Packard, and John L. LeConte come to mind as major figures in nineteenth century American entomology for whom we need scholarly biographies.—*Conner Sorensen, University of Alaska Southeast, 11120 Glacier Highway, Juneau, Alaska.*

J. New York Entomol. Soc. 97(3):364–365, 1989

Insect Flight: Dispersal and Migration.—W. Danthanarayana, ed. 1986. Springer-Verlag, Berlin.

This collection of papers covers a wide variety of topics on insect migration by flight, ranging from biochemical and physiological to ecological and evolutionary. By presenting viewpoints from very different perspectives, this volume succeeds in providing a more holistic view of the field. My only criticism is that care was not taken to make all papers accessible to as wide an audience as possible. There is a tendency to forget that technical terms, such as "hypertrehalosemia," may not be familiar to non-physiologists, or that many of us do not know how to interpret a radar photo.

On the positive side, the volume is permeated with awareness that field studies are essential for understanding insect migration. As Taylor notes (Chap.20), "migration is not easy to create indoors." A particularly good example of how lab studies, field behavior observations, and radar tracking can complement each other in presenting a unified picture of migration is found in Gatehouse's chapter on the African armyworm (Chap. 9). Development of radar technology is responsible for many recent advances in our understanding of insect migration under natural conditions. This is attested by the fact that results from radar tracking are used in most chapters to illustrate one point or another, while three chapters (6, 13, and 16) are exclusively dedicated to it.

Another recurring theme throughout the book is that insect migration is an adaptation for dealing with environments that vary in time and space. Gatehouse (Chap. 9) argues that rigid genetic determination of propensity to migrate evolves not when reliable environmental cues are absent, but when they are irrelevant. This situation may arise in a species with ubiquitous host plants, since the balance between the costs of staying and leaving is in favor of the latter, especially if the species is subject to heavy mortality from natural enemies. In a similar vein, Dixon and Howard (Chap. 10) review polymorphism in migratory propensity exhibited by many aphids. They show that this polymorphism among the members of a clone is programmed.

While subscribing to the view that insect migration represents an adaptive syndrome, Dingle (Chap. 2) nevertheless cautions that the knowledge of evolutionary and genetic aspects of insect migration is still in embryonic form. For example, we do not know why migrants are not selected out of many "pied paper" Lepidoptera (these insects migrate north in the spring, but are caught by winter before they can migrate south). Gibo (Chap. 12) treats the famous exception to this rule, the monarch

butterfly which possesses a remarkable directional control enabling it to return to its Mexican overwintering sites in the fall.

Risks of dispersal, however, are very real. Many migrating insects are carried to hostile environments where they perish, such as snow-covered peaks (Edwards, Chap. 14). Curiously, the fallout of these "derelicts of migration" becomes the basis of a scavenger and predator community, and may hasten the recolonization of huge disturbed areas such as the blast zone of Mt. St. Helens.

In a very interesting chapter, Farrow (Chap. 13) explains the concepts of the boundary-layer and synoptic scale meteorology, and how atmospheric processes help us understand migration of micro-insects (insects that are less than 1.5 cm in length). Maybe someone familiar with meteorology would not be impressed, but I found this chapter very instructive. By flying at night insects appear to utilize the nocturnal temperature inversion in the planetary boundary level. Several chapters deal with night-flying insects. Danthanarayana (Chap. 7) discusses the lunar periodicity in insect flight. Riley and Reynolds (Chap. 6) give an overview of various cues that may be used by night-flying insects for orientation, while Danthanarayana and Dashper (Chap. 8) focus on one of these cues: polarized light from natural sources. Mikkola (Chap. 11) describes the effect of wind on insect migrations into Finland.

Endocrine stimulation of migratory behavior, and endocrine control of flight metabolism are discussed in Chap. 3 and Chap. 4, respectively. Four chapters deal with applied topics: Chap. 15 and 16 with migration in *Heliothis zea* and relatives, Chap. 17 with dispersal models of agricultural pests, and Chap. 18 with insects of public health importance. Several chapters are concerned with developing techniques for tracking migrating insects. Sounds produced by insects are important because wingbeat frequencies of insects can be detected by radar (Belton, Chap. 5). Lingren et al. (Chap. 19) describe the uses of night-vision equipment for observation of insect behavior at night.

In summary, this volume will be of interest to many workers in the field of insect flight. While not attempting to give a comprehensive overview of all aspects of insect flight, this book (especially if read in combination with a more physiologically oriented volume of the same title (*Insect Flight*. Goldsworthy, G. J., and Wheeler, C. H. (eds.). 1989. CRC Press, Boca Raton) serves a valuable function by bringing together different perspectives on insect migration, ranging from biochemical to evolutionary. In this age of increasing specialization, such attempts should be encouraged.—*Peter Turchin, So. Forest Exp. Station, Forest Service-USDA, Pineville, Louisiana 71360.*

J. New York Entomol. Soc. 97(3):365–366, 1989

Biogeography and Taxonomy of Honeybees.—Friedrich Ruttner. 1988. Springer-Verlag, New York. xii + 284 pp. $87.50 (hardcover).

The biology and morphometrics of honeybees have received increasing attention over the past decade because of the problems encountered in the Western Hemisphere with the Africanized honeybee. For such a small genus, *Apis* is one of the most widespread and, in human eyes, dominant groups of insects. However, up until